SECRET
(When Filled In)

SPEED LETTER	REPLY REQUESTED	DATE
	X YES ___ NO	18 April 1969
		LETTER NO. TSSG/APSD/IEB SL-018/69

TO : Chief, TSSG/ESD
ATTN: Chief, TSSG/ESD/EL

FROM: TSSG/APSD/IEB

REF: Project 450937

1. In support of the referenced project it is requested that you expose a series of test patterns on film type 3404 for the purpose of investigating the influence of dual gamma processing on microimage mensuration.

2. You should provide enough exposures to allow for some to be processed dual gamma and some by interrupted spray. Samples for evaluation will be made available to IEG/PHD for mensuration and to appropriate NPIC personnel for evaluation of the dual gamma effect on digital image restoration. Needless to say, replicates will be necessary also to establish the dimensional reliability of the exposure series.

3. Processing support will be arranged through the Eastman Kodak Company by APSD.

4. Further details of this proposed experiment will be discussed with your designee.

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REPLY

DATE 28 April 1969

1. It is recommended that your request for target exposures be reconsidered and integrated into a more comprehensive plan based upon prior Image Analysis work.

2. ESD/EL is presently completing the first phase of a study on the photographic effect in mensuration. This program is being conducted by Data Corporation and has the primary objective of identifying the magnitude of systematic measuring errors which are based in the photographic process. In the course of reducing data from these experiments, an analysis of variance is carrie out such that random errors are partitioned and allocated to the various sources. This program is being continued to include dual gamma processing with an estimated completion date of 15 August 1969. The first phase was carr ed out on Trenton processed materials and provides a control for comparison with dual gamma results. The final report on the first phase will be published in the very near future. Results show that the photographically related systematic errors are very appreciable and in most cases far exceed the random errors due to man or machine.

3. The test materials from the first phase of the program have been retained and are available. The test materials from the second phase (dual gamma) will be available as soon as the second phase data are collected. Continued on Sheet.

SIGNATURE

RESPONDER'S FILE

FORM 1831

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SPEED LETTER REPLY CONTINUED

One set of exposures consists of photographs of two targets, one of which is a reversal of the other (0.9 AD reflection density). Each target is photographed at nine exposure levels, replicated five times each. Measurements are normally made by three operators using mensuration equipment with ± 1 μ in accuracy over the measuring area.

4. It is suggested that the subject request be accommodated by use of the test materials from this project. These materials can be measured in-house with the following advantages:

a. Provide a good control in the form of the Trenton processed data.

b. Provide an operational mensuration comparison which will substantiate the results of Data Corporation.

c. Maintain the same statistical confidence limits maintained in earlier work.

5. A schedule is now in the process of formulation and will be forwarded as soon as available.

[redacted]

NPIC/TSSG/ESD/EL/Ch

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PROPOSED WORK STATEMENT
MENSURATION STUDY - FOLLOW ON

The primary objective of this program is the study analytic correction methods for mensuration error. Some preliminary work has shown the significant improvement generated in mensuration by correcting for the spread function of the taking system. Therefore, all data will be collected by microdensitometer in digital form such that the correction techniques can be implemented with a computer. The proposed work is divided into two parts. These are:

1) Continuation of work on essentially one-dimensional objects (Single Bars)

This would require the tracing and digitizing of single bars of the 3 images that are closest to the center portion of the sensitometric curve.

The following will be traced:

f/8
- Target 1, Exposures 40, 100, 200 for all five sets.
- Target 6, Exposures 100, 500, 200 for all five sets.

f/16
- Target 1, Exposures 100, 200, 500 for all five sets.
- Target 6, Exposures 1000, 2000, 4000 for all five sets.

The final output of this study will be an analytic technique to compute corrected mensuration values for single bar objects. Expected completion date of this task would be April 15, 1969.

2) Application of Correction Techniques to Essentially Two-Dimensional Objects.

This work would be similar to that proposed in 1), but with the added complexity of considering objects that vary in both dimensions such as circles, and triangles. The data will be collected by using the rastor scan capability of the microdensitometer and magnetic tape digitizer. Attempts will be made to apply corrections to data both with and without an apriori assumption as to the shape of the object. The feasibility of correction of measurements on these type of objects will be examined, and if it proves feasible, correction techniques will be developed. The expected completion date of this task is June 15th.